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Developing a model for tourism smart card and evaluating its effect on tourism services

Abstract

Nowadays, the use of information technology in the tourism industry has increased the service quality and reduced its prices for tourists. Also, the necessity of developing an integrated network of tourism services is significantly visible. It can play a major role in generating revenue for tourism companies, as well as job creation, sustainable development, and positive environmental effects. The main purpose of this study is to develop a model for tourism smart card (TSC) and evaluate its effects on tourism services. Accommodation, transportation, catering, and purchasing are considered major tourism services. The results show that TSC can improve all four tourism services. Finally, a model is developed by structural equation modeling, and all indices show a good fit for the model. It should be mentioned that in the case of implementation and use of TSCs, tourists and tourism-related organization will be affected. This system can change the main needs of tourists, as it brings valuable services to tourists in sectors such as transportation, accommodation, restaurants, recreational centers, travel insurance. On the other hand, it is effective in revenue generation, an organization of tourism firms, skilled staff training, advertising and earnings for the organization and creation of an accurate database of customers.

Key words: tourism smart card; tourism services; tourist; information technology; Iran

Introduction

Tourism plays an essential role in regional development which cannot be denied. Despite the extensive revenue that this industry has had for many countries worldwide, developing countries have earned a small share of this income. Due to its climatic conditions, historical attractions, and cultural diversity, they could be a desirable tourism destination to attract historical-cultural tourists. As the products offered in cultural and historical tourism, these remain unique and has its particular validity which cannot be imitated, and they are less threatened by other competitive destinations (Iordanova, 2017). In many countries, due to gaining foreign income and creating direct and indirect jobs, the tourism industry is considered an engine of sustainable economic development.

The tourism sector accounts for 5% of global GDP and 4% of world exports as the fourth most important export sector, after oil, chemical products, and automobile manufacturing. The tourism industry has led to the creation of 235 million jobs; this means that one job out of every 12 jobs in the world is dedicated to the tourism sector (Ivanov & Ayas, 2017). Tourism destinations are chosen by tourists because of the perception of the destination image. Tourism destination image has been considered and influenced many decision-making models in the tourism industry. It is believed that

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tourism destinations that have a stronger positive image are selected more than the others don't (Salim, 2017; Marti & Puertas, 2017).

However, the potential consumer's perception of a tourism destination has significant differences with objective realities. Thus, what leads to client selection is his understanding of a destination. Usually, deduction or inference of any potential customers derive from favorable or unfavorable advertising or based on experience and their knowledge (Koo, Ricci, Cobanoglu & Okumus, 2017). The directors of each tourism destination should study the reflected perceived image by various sectors of the tourism destination (Ivanov & Dimitrova, 2014). High-quality services at low cost are now provided by information technology for tourists. Also, the previous services which are used by tourists traditionally in the past have been made available through information technology now. Travelers can use travel services without worrying about something by using TSC and benefit makes destinations look great (Pesonen, Komppula & Riihinen, 2015).

The aim of this study is to develop a model for tourism smart card (TSC) and evaluate its effects on tourism services. So, accommodation, transportation, catering, and purchasing services are considered as four major tourism services. There is an innovative point for this research, and it is the first time for the developing countries that a model is examined for TSC and the function of TSC has been investigated in tourism services.

Literature review

The growth of communications, telecommunications, and informatics industries have created a new global revolution as the world observes it every day. Information and communication technology (ICT) revolution has left remarkable effects in all economic, social, political, national, and security sectors (Pesonen et al., 2015; Ghanem, Mansour & Adel, 2017; Ruiz Gómez, Rodríguez Fernández & Navio-Marco, 2018). The tourism industry has not been an exception to the development of this technology and has tried to find evolution trend in this system to provide appropriate services (Anwar, Carmody, Surborg & Corcoran, 2014). One of the most important applications of information technology (IT) is related to travel and leisure time (Malerba, 2002). Increasing production of information in the field of tourism has led to the adoption of innovative technologies for the proper performance of the information in the tourism industry (Neve, Peeters, Samyde & Quisquater, 2003). Integrated technology and the use of its advantages in various fields has led to the creation of application fields in recent decades such as E-government, E-commerce, E-learning, and E-tourism (Malerba & Orsenigo, 1997; Sedmak, Planinc, Kociper & Planinc, 2016). In contrast to traditional credit cards, a multipurpose smart card can be used for in various shopping malls and as a ticket for public transportation (Buonincontri & Micera, 2016; Huang, Goo, Nam & Yoo, 2017).

Since the 1990s, the use of smart cards has become remarkable as a result of Internet growth and professional mobile communication technologies (Blythe, 2004). A smart card is a plastic card with an embedded microprocessor chip which is able to store a considerable amount of data and compute lots of operations. Most smart cards are like a standard credit card in size (Taherdoost & Masrom, 2009). Nowadays, the main trend is the use of multi-application cards. Multiple application cards are a kind of smart card which support different types of applications. So, this cause reducing the number of cards in the wallet (Al-Alawi & Al-Amer, 2007; Taherdoost, 2017). A smart card is a gadget which includes a circuit which can be either a safe microcontroller or tantamount intelligence with a memory. The card interacts with a reader through direct physical linkage or with a wireless frequency interface (Taherdoost, Sahibuddin & Jalaliyoon, 2014).

Smart cards

Smart card data (SCD) predicated to the information recovered from automated fare collection systems widely used in urban public transportation (Li and Chen, 2016). E-ticketing got popularity because of its great advantages versus paper tickets in the form of a faster, cheaper and safer (Cheng & Chen, 2016). SCDs can be divided into different types according to the communication port and the type of chips that are clustered regarding communication port such as contact smart cards, contactless smart card, combine cards and hybrid cards (Mackinnon & Yatawara., 1998). The smart cards are used many in sectors such as government, finance, transportation, telecommunication, treatment, education, and retailing (Taherdoost, 2017; Li & Chen, 2016). Also, it has lots of applications in the tourism industry. On the other hand, tourism is one of the fields that generate revenue for both the public and private sector. Improving and upgrading this system to a dynamic, up-to-date, safe, and rapid system where the flow of information supplies required by the system, cause to improve tourism service and increase the quality of tourism products (Zahari & Othman, 2013). Nowadays in most industrialized countries by linking tourism and IT, smart cards have developed a particular position in the tourism system (Gretzel, Koo, Sigala & Xiang, 2015; Luna-Cortés, 2017). By using these cards, service management and the possibility of access to the location as well as personal identification information, transport, and payment of cost is possible and accessible whenever required (Rankle, 2007; Handayani, Ivanov & Korstanje, 2017).

Tourism smart card (TSC)

The Smart Tourism Development concept rises from the smart cities (Buhalis & Amaranggana 2015), characterized as cities in which the immense use of technology allows to arrange all activities, information, and services in real time, interconnect all local organizations, and improve urban efficiency (Vicini, Bellini & Sanna, 2012). TSC is created to facilitate access services and reduce costs for tourism purposes (Li, Hu, Huang & Duan, 2017). travel and access to services for tourists will be done easily By using TSC (Lindley, 1997). Issuance of health smart card, discount and reward cards, and automotive fuel cards are the previous activities in the field of IT. Due to the rapid growth of smart cards in the world, it is necessary to establish the technology in developing countries.

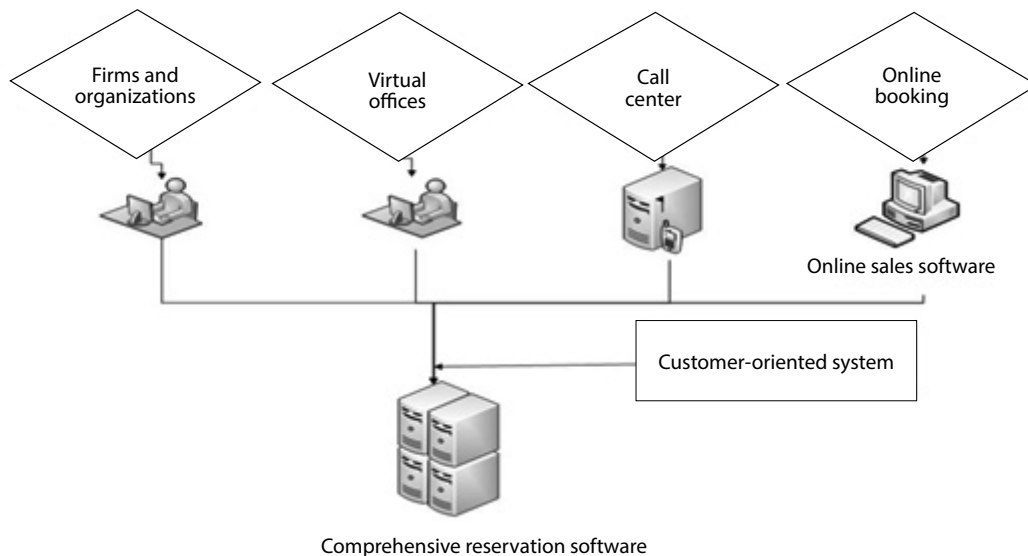
The use of TSC in recent years and its effect on the welfare of tourists, destinations, and the entire tourism industry are great motivations for researchers of this study. However, in most studies, it is done only for a certain segment of the tourism industry, for example, just for tourists or suppliers (Lundvall, Johnson, Andersen & Dalum, 2002; Chen & Tseng, 2005; Wang & Hsu, 2016). Albeit, smart card technology is not novel, the use of smart cards is increasing in public transit agencies (Pelletier, Trépanier & Morency, 2011), along with the number of researchers on smart card use in public transit systems (Munizaga & Palma, 2012; Ma, Wu, Wang, Chen & Liu, 2013; Zhao, Frumin, Wilson & Zhao, 2013). Nowadays public transit agencies are placing more significance on transfers. With only SCD, a method Based on elapsed time threshold is often used to identify transfers (Hoffman, Wilson & White, 2009; Seaborn, Attanucci & Wilson, 2009) also, another major aim of using SCD is to analyze travel template of public transit users. Newman and Sutter (2002) indicated that security and privacy are the key factors that influence the intention of electronic payment and use of smart cards. In recent years, many types of research transit have been conducted on the use of SCD in public transit, most of them focus on public transit user behaviors, such as origin and destination inference, transfer point estimation and travel pattern analysis (Bagchi & White, 2005; Pelletier et al., 2011). Many researchers explore the similarities in travel templates using boarding time as the main travel characteristic (Agard, Morency & Trépanier, 2006; Morency, Trépanier & Agard, 2006; Ortega-Tong, 2013). As mentioned above, recent researchers have assessed the potential benefits of using SCD in public transit. But if SCD is not so reliable, analysis based on SCDs will be sophisticated and useless.

SCD is originally created for financial analysis, and its data structure varies with different pricing programs. It's not only too much work but also full of uncertainty. Various organizations offer their services through smart cards. The usage of these cards is rapidly expanding. The most important benefits that are mentioned so far for these cards are increasing security and ease of transactions and reducing cost and traffic. It is evident that with the widespread use of cards in daily activities, peace and satisfaction of citizens will increase, and security and civic culture will promote (Lundvall et al., 2002). The smart card is used in government affairs, finance, transportation, telecommunications, healthcare, education, retail, and many other industries especially tourism (Zoltan & McKercher, 2015).

As an implication in the tourism industry, TSCs facilitate services. This system as a promotion helps to identify loyal customers. Moreover, in the case of equipping the hotel, the TSC can be used to control facilities in the hotels (Dhar, 2005). In Figure 1 TSC implication is shown. Some other benefits of TSCs are as follows: a comprehensive statistical database of potential destinations, passengers and visitors, identifying the most visited places, creating thousands of new interdisciplinary jobs, positive environmental effects, etc (Rankle, 2007; Ivanov, Ivanova & Iankova, 2014; Wang & Hsu, 2016). Therefore, it is reasonable to propose the following hypothesis:

H1: There is a significant relationship between TSC and tourism services.

Figure 1
TSC implication



Accommodation

One of the activities which become common is to book tickets and hotels online. Hotel reservation online is one of the most popular ways to choose accommodation centers around the world. Reservation of the hotel separately has led many companies to set up a system to provide hotel reservation services and offer competitive prices to attract more customers. This system facilitates many services such as special offers, vacant room availability, hotel location, and price conveniently. Also, the online booking system is very convenient for people who decide at the last minute. So, hotels can improve their services by using TSC (Anwar et al., 2014). It helps hotels to recognize loyal customers and aware them about discounts and special offers. On the other side, hotels can control their customer's accessibility of specific services (Li, Hu, Huang & Duan, 2017). So, the following might be expected as a hypothesis:

H2: There is a significant relationship between accommodation and tourism services.

Transportation

Ticket booking is another tourist service that all airlines should provide for their customers. So, tourist can buy their tickets without any intermediary. The facility is simply and completely secured in online payments. Many tour operators around the world are doing their best to sell their tickets through their websites, which increase their profitability (Taherdoost et al., 2014). Therefore, the following hypothesis is proposed:

H3: There is a significant relationship between transportation and tourism services.

Catering

There are many competitors in every business, and everyone is trying to get more customer satisfaction and sales. What makes a competitor success is to offer a better and different service especially in catering services. One of these benefits and distinctive services is the provision of electronic services in a restaurant. Besides, the food quality, there are other factors that can make a distinction of better services (Buhalis & Amaranggana, 2015). In an online ordering system, the customer can find out about his/her order status and the approximate time of receiving food. On the other hand, managers can easily identify loyal customers and offer them a discount or free delivery. This electronic service can be provided through a TSC (Taherdoost, 2017). Thus, it is hypothesized that:

H4: There is a significant relationship between catering and tourism services.

Purchasing

The use of TSC in shopping makes it easy to monitor customer feedback. This customer feedback can improve sales and provide a good assessment of the market needs. This makes tourists feel safe with their shopping, and if they feel that a store cares about them, they will become a loyal customer (Zoltan & Mckercher, 2015). Therefore, it is reasonable to propose the following hypothesis:

H5: There is a significant relationship between purchasing and tourism services.

Methodology

According to rationalistic and naturalistic approaches, this study lies in the quantitative studies group. In the most general categorization level, based on the information gathering, studies are divided into library and survey, so these two methods are used in this study. The population of this study consists of tourists who have traveled to Iran as a developing country in recent two years. They can evaluate the relationship between tourism services and TSC well. The random sampling method is used, and the sample size is estimated by Cochran formula which is selected 384 persons to evaluate. Table 1 depicts the characteristics of the respondents.

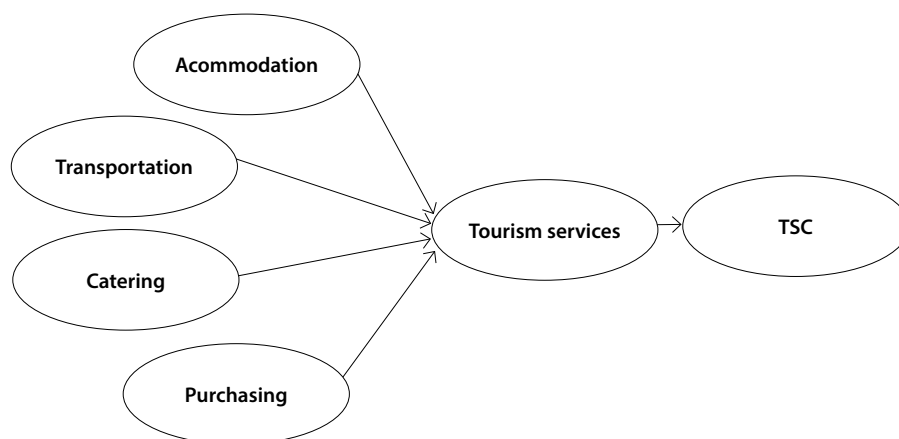
Table 1
Respondent's profile

Characteristics	Category	Frequency	Percentage
Gender	Male	205	53
	Female	179	47
Age	24 and below	42	11
	25-34	92	24
	35-44	113	29
	45 and over	137	36

Table 1 Continued

Characteristics	Category	Frequency	Percentage
Occupation	Government officers	125	33
	Company employees	184	48
	Business owner owner	75	19
Tourist	Asian	157	41
	European	148	38
	American	79	21

This research has been carried out at inferential-descriptive statistics level. The data of this study is obtained from the population's opinion which is based on a survey questionnaire. A questionnaire is developed by tourism experts which overlap with the purpose of this study. The questionnaire consisted of 2 sections of tourists' demographic information and 30 questions to assess the effects of TSC on tourism services. As indicators to evaluate latent variables, 8 questions were developed for accommodation services which adopted from Buonincontri and Micera (2016) and Ivanov and et al. (2014), whereas 6 questions were selected for transportation services which derived from Blythe (2004) and Wang and Hsu (2016). Catering services consist of 4 questions derived from Zahari and Othman (2013). As well as, 6 questions were used for purchasing services which adopted from Buhalis and Amaranggana (2015) and Zoltan and McKercher (2015). As TSC indicators 6 questions were selected from Ma, Wu, Wang, Chen and Liu (2013) and Zhao, Frumin, Wilson, and Zhao (2013). A five-point Likert scale was employed in this study ranging from strongly disagree (1) to strongly agree (5). Cronbach's alpha and composite reliability were performed for Reliability analysis, as well as Convergent validity was confirmed by the average variance extracted. Confirmatory factor analysis (CFA) was used to test the model. A theoretical model was tested by using a structural equation modeling (SEM) analysis by AMOS software. Therefore, the main aim of this study is to investigate the effects of TSCs on tourism services and also to develop a model for TSC. So, it has considered through four services which consist of accommodation, transportation, catering and purchasing services. These services are shown in Figure 2, as a theoretical model of this study.

Figure 2
Theoretical model

According to Table 2, the results of the measurement model with 5 latent constructs and 30 indicators are presented. As suggested by Hair et al. (2013), the factor loading was performed to confirm the reliability, while Cronbach's Alpha (CA) and Composite Reliability (CR) were checked to confirm the

construct reliability. All factor loadings are significant and greater than 0.7 for all items, so the model satisfies indicator reliability criteria (Chin, 1998). Meanwhile, Cronbach's alpha and Composite Reliability exceeded 0.7 for all constructs (Babin et al., 2010). Finally, for convergent validity, the average variance extracted (AVE) for all constructs presented greater than the threshold value of 0.5 (Bagozzi & Yi, 1988). Therefore, all of the constructs and indicators in this study reflect the acceptable values.

Table 2
Reliability and validity of the construct

Variables	Indicators	Factor loading	CA	CR	AVE
Accommodation services	Service quality (A_1)	0.852	0.763	0.792	0.678
	Room reservation (A_2)	0.870			
	Hotel safety (A_3)	0.897			
	Hygiene and cleanliness (A_4)	0.774			
	Facilities (A_5)	0.792			
	Staff greeting (A_6)	0.801			
	Location and accessibility (A_7)	0.822			
	Fair prices (A_8)	0.839			
Transportation services	Online ticket booking (Tr_1)	0.756	0.812	0.871	0.712
	Seat comfort (Tr_2)	0.806			
	Entertainment on the trip (Tr_3)	0.763			
	Optional services (Tr_4)	0.752			
	Various prices (Tr_5)	0.821			
	Fine and tax payment (Tr_6)	0.842			
Catering	Online ordering (C_1)	0.841	0.782	0.806	0.569
	Food delivery (C_2)	0.907			
	Easy payment (C_3)	0.853			
	Special catering services (C_4)	0.899			
Purchasing	Good quality and fair prices (P_1)	0.842	0.891	0.921	0.641
	Online purchase services (P_2)	0.961			
	Discount purchases (P_3)	0.849			
	Enjoyable shopping (P_4)	0.840			
	Cash transfer (P_5)	0.864			
	Various choices (P_6)	0.871			
TSC	Perceived usefulness (Ts_1)	0.741	0.724	0.789	0.638
	Ease of use (Ts_2)	0.763			
	Cost decreasing (Ts_3)	0.859			
	Time-saving (Ts_4)	0.811			
	Generating new jobs (Ts_5)	0.877			
	Low risk (Ts_6)	0.769			

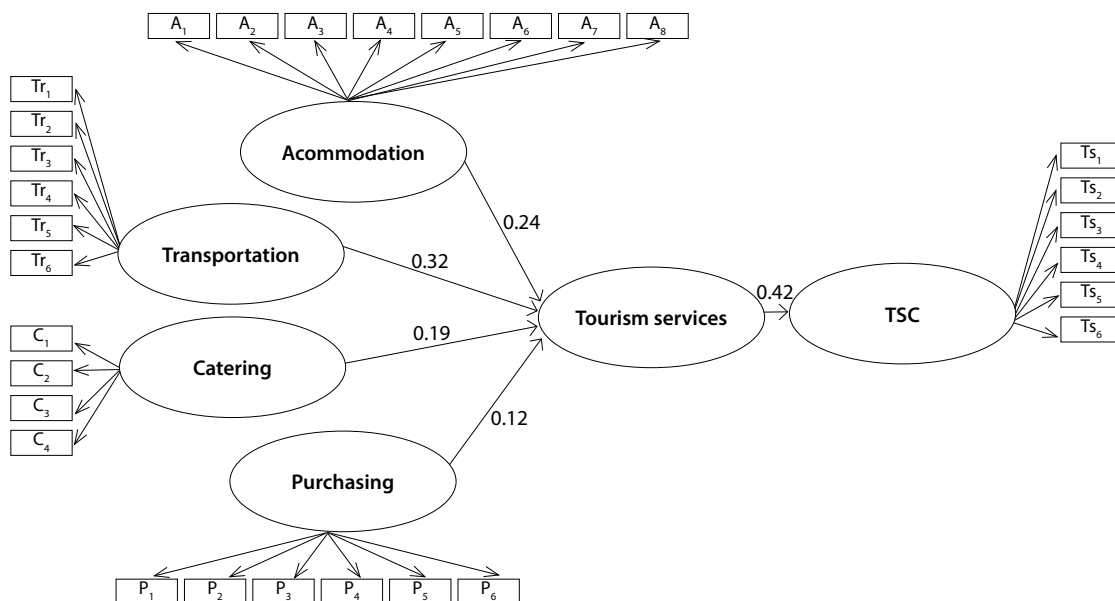
Results

The structural model was tested to assess fit indices and the five hypotheses by CFA. As it was shown in Table 3, the value of chi-square divided into df equals 2.60, and it is less than 3, so the model is fit in this condition. Moreover, as it can be found, the RMSEA index value is 0.044, and it is less than 0.05, so the model shows a good fit concerning RMSEA index. As well as The values of indices AGFI and GFI are, respectively, 0.92 and 0.91, so, they are fit for the model. SEM was used to conclude on the overall fitness of the model a set of indices should be considered that ensure the model is fit. All fit indices are shown in Table 3 and revealed that the model is fit the data reasonably. The structural results of the model are represented in Figure 3.

Table 3
Model fit indices

Fit indices	Values obtained	Criterion
Chi-square	386.97	The less, the fit better
Significant chi-square	0.05259	P>0.05
Chi-square/df	2.60	3 and less
RMSEA	0.044	0.05 and less
GFA	0.91	0.9 and more
AGFA	0.92	0.9 and more

Figure 3
Structural equation modelling results



As revealed in figure 3, the standardized path coefficients which link variables were calculated. They used to examine latent construct in relation to another. The results indicated that the relation between TSC and tourism services is significant (coefficient=0.42). paths of destination quality dimensions to destination loyalty were statistically significant in positive directions. It is indicated that accommodation (coefficient=0.24), transportation (coefficient=0.32), catering (coefficient=0.19) and purchasing (coefficient=0.12) had the positive direct effects on tourism services. These results indicated that all hypotheses were supported. The summary of the findings is presented in Table 4.

Table 4
Hypotheses test

Variables	Coefficient (β)	T value	Result
H ₁ : TSC	0.42	0.296	supported
H ₂ : Accommodation	0.24	0.266	supported
H ₃ : Transportation	0.32	0.345	supported
H ₄ : Catering	0.19	0.289	supported
H ₅ : Purchasing	0.12	0.369	supported

Conclusion and implications

TSCs can create an economic revolution for tourism-related organizations. It will create new jobs. In addition to generating revenue and profitability for these organizations. Presenting a good reputation and regularity of tourism in the region and the country, facilitating services, improving customer satisfaction, having a widespread statistical and customer information society, identifying the most popular resorts are the most important advantages of TSCs. It also brings major environmental impacts, such as the elimination of paper usage in the issuance of various types of tickets and bills. This study tried to offer practical solutions for TSCs in the tourism industry. Moreover, using these findings can help other researchers in conducting similar researches. The aim of this study is to assess the effects of TSCs on tourism services in developing countries. The results of Pearson correlation show that there is a strong positive correlation between using TSCs and tourism services. Finally, a model for TSC is developed based on tourism services by using SEM. As it is mentioned, an integrated tourism smart network brings benefits to the whole country by creating sustainable development, improving the economic condition, growing advances in information technology, etc. By launching this network, the intermediary between the provider and the recipient of services reduces, and the quality of service improves.

The results show that in case of implementation of TSC projects both side of tourists and tourism-related organizations are affected. It should be noted that TSC could transform the major needs of the tourist. So that sectors such as transportation, accommodation, restaurants, entertainment centers, travel insurance, and health insurance are included. On the other hand, it is useful for organisations in sectors such as creating direct income to the organisation, organizing tourism management teams and training of skilled workers, accepting ads and earning money for the organisation, removing intermediaries and creating direct revenue for the organisation, and creation of detailed statistical database for the future plans for the organisation.

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